CLAIMS

What is claimed is:

1   1.   An apparatus comprising:
2   a buffer memory of a first type to store data associated with a connection
3   identifier corresponding to a channel in a network, the data being organized into at least
4   one chunk based on a linked list, the connection identifier identifying a connection in
5   the channel, the data being part of a data stream associated with the connection;
6   a packet memory of a second type coupled to the buffer memory to provide
7   access to the stored data when a transfer condition occurs.

1   2.   The apparatus of claim 1 further comprises:
2   a descriptor memory to store descriptor information corresponding to the
3   chunks; and
4   a controller coupled to the descriptor memory and the buffer memory to control
5   data transfer between the buffer memory and the packet memory using the descriptor
6   information.

1   3.   The apparatus of claim 2 wherein the at least one chunk comprises:
2   a chunk header to store chunk information associated with the linked list;
3   a chunk data block to store the data.

1   4.   The apparatus of claim 3 wherein the chunk information includes at least
2   one of a pointer to point to one other chunk, a size specifier to specify size of the at
3   least one chunk, and a type specifier to specify type of the at least one chunk.

1   5.   The apparatus of claim 4 wherein the at least one chunk is one of a head
2   chunk corresponding to one end of the data stream, a linking chunk corresponding to an
3   intermediate portion of the data stream, and a tail chunk corresponding to one other end
4   of the data stream.

1   6.   The apparatus of claim 5 wherein the descriptor information includes at

2   least one of head and tail pointers, the head and tail pointers pointing to the head and

3   tail chunks, respectively.

1   7.   The apparatus of claim 6 wherein the connection identifier points to one

2   of the head and tail pointers.

1   8.   The apparatus of claim 2 wherein the controller comprises:

2   an ingress queue to buffer the data stream of a packet from an ingress of the

3   channel, the packet having a packet size; and

4   a queue segmenter to chunk the data stream into the at least one chunk.

1   9.   The apparatus of claim 8 wherein the buffer memory comprises an input

2   buffer memory to store the at least one chunk transferred from the queue segmenter.

1   10.   The apparatus of claim 9 wherein the input buffer memory comprises a

2   queue associated with the connection identifier, the queue having a threshold and being

3   configured to store the at least one chunk.

1   11.   The apparatus of claim 10 wherein the transfer condition includes at

2   least one of an overflow of the threshold, the packet size, and a scheduled egress

3   request.

1   12.   The apparatus of claim 11 wherein the controller further comprises:

2   a data combiner to combine the data portion of one chunk with the data portion

3   of at least one other chunk in the input buffer memory; and

4   a write circuit to burst write according to the scheduled egress request, the write

5   circuit to burst write the combined chunk data blocks to the second memory when the

6   packet size indicates that the packet is long, the combined chunk data blocks forming a

7   contiguous data block in the second memory, the write circuit to write the combined

8   chunk data blocks to an output buffer memory of the first type when the packet size

9   indicates that the packet is short.

1   13.   The apparatus of claim 12 wherein the controller further comprises:

2   a list creator to create an ordered list of pointers associated with the chunk

3   headers of the one and the at least one other chunk, the ordered list of pointers being

4   transferred to the output buffer memory of the first type at a location pointed to by the

5   head pointer;

6   a read circuit to burst transfer the contiguous data block from the second

7   memory to the output buffer memory using the ordered list of pointers in the output

8   buffer memory when the packet size indicates that the packet is long; and

9   an egress queue to buffer the contiguous data block transferred from the output

10   buffer memory.

1   14.   The apparatus of claim 13 wherein the first type is a static random access

2   memory and the second type is a synchronous dynamic random access memory.

1   15.   The apparatus of claim 14 wherein the input buffer memory and the

2   output buffer memory have same sizes.

1   16.   The apparatus of claim 14 wherein the input buffer memory and the

2   output buffer memory have different sizes.

1   17.   A method comprising:

2   storing data associated with a connection identifier corresponding to a channel

3   in a network in a buffer memory of a first type, the data being organized into at least

4   one chunk based on a linked list, the connection identifier identifying a connection in

5   the channel, the data being part of a data stream associated with the connection;

6   providing access to the stored data using a packet memory of a second type

7   when a transfer condition occurs.

1   18.   The method of claim 17 further comprises:

2   storing descriptor information corresponding to the chunks in a descriptor

3   memory; and

4   controlling data transfer between the buffer memory and the packet memory

5   using the descriptor information.

1   19.   The method of claim 18 wherein storing the data comprises:

2   storing chunk information associated with the linked list in a chunk header;

3   storing the data in a chunk data block.

1   20.   The method of claim 19 wherein the chunk information includes at least

2   one of a pointer to point to one other chunk, a size specifier to specify size of the at

3   least one chunk, and a type specifier to specify type of the at least one chunk.

1   21.   The method of claim 20 wherein the at least one chunk is one of a head

2   chunk corresponding to one end of the data stream, a linking chunk corresponding to an

3   intermediate portion of the data stream, and a tail chunk corresponding to one other end

4   of the data stream.

1   22.   The method of claim 21 wherein the descriptor information includes at

2   least one of head and tail pointers, the head and tail pointers pointing to the head and

3   tail chunks, respectively.

1   23.   The method of claim 22 wherein the connection identifier points to one

2   of the head and tail pointers.

1   24.   The method of claim 18 wherein controlling the data transfer comprises:

2   buffering the data stream of a packet from an ingress of the channel by an

3   ingress queue, the packet having a packet size; and

4   segmenting the data stream into the at least one chunk.

1   25.   The method of claim 24 wherein storing the data comprises storing the at

2   least one chunk transferred from the queue segmenter in an input buffer memory.

1   26.   The method of claim 25 wherein storing the at least one chunk in the

2   input buffer memory comprises storing the at least one chunk in a queue associated

3   with the connection identifier, the queue having a threshold.

1   27.   The method of claim 26 wherein the transfer condition includes at least

2   one of an overflow of the threshold, the packet size, and a scheduled egress request.

1   28.   The method of claim 27 wherein controlling the data transfer further

2   comprises:

3   combining the chunk data block of one chunk with the chunk data block of at

4   least one other chunk in the input buffer memory;

5   burst writing, according to the scheduled egress request, the combined data

6   portions to the second memory when the packet size indicates that the packet is long,

7   the combined chunk data blocks forming a contiguous data block in the second

8   memory; and

9   writing, according to the scheduled egress request, the combined chunk data

10 blocks to an output buffer memory of the first type when the packet size indicates that

11 the packet is short.

1   29.   The method of claim 28 wherein controlling the data transfer further

2   comprises:

3   creating an ordered list of pointers associated with the chunk headers of the one

4   and the at least one other chunk, the ordered list of pointers being transferred to the

5   output buffer memory of the first type at a location pointed to by the head pointer;

6   burst transferring the contiguous data block from the second memory to the

7   output buffer memory using the ordered list of pointers in the output buffer memory

8   when the packet size indicates that the packet is long; and

9   buffering the contiguous data block transferred from the output buffer memory

10 in an egress queue.

1   30.   The method of claim 29 wherein the first type is a static random access

2   memory and the second type is a synchronous dynamic random access memory.

1   31.   The apparatus of claim 29 wherein the input buffer memory and the

2   output buffer memory have same sizes.

1   32.   The apparatus of claim 29 wherein the input buffer memory and the

2   output buffer memory have different sizes.

1   33.   A system comprising:

2   a channel in a network having an ingress and egress;

3   a data buffer circuit coupled to the channel to buffer data transmitted over the

4   channel, the data buffer circuit comprising:

5   an input buffer memory of a first type to store data associated with a

6   connection identifier corresponding to the channel, the data being organized into

7   at least one chunk based on a linked list, the connection identifier identifying a

8   connection in the channel, the data being part of a data stream associated with

9   the connection,

10   an output buffer memory of the first type to store the data transferred

11   from the input buffer memory, and

12   a packet memory of a second type coupled to the input and output buffer

13   memories to provide access to the stored data when a transfer condition occurs.

1   34.   The system of claim 33 wherein the data buffer circuit further comprises:

2   a descriptor memory to store descriptor information corresponding to the

3   chunks; and

4   a controller coupled to the descriptor memory and the input and output buffer

5   memories to control data transfer between the buffer memories and the packet memory

6   using the descriptor information.

1   35.   The system of claim 34 wherein the at least one chunk comprises:

2   a chunk header to store chunk information associated with the linked list;

3   a chunk data block to store the data.

1   36.   The system of claim 35 wherein the chunk information includes at least
2   one of a pointer to point to one other chunk, a size specifier to specify size of the at
3   least one chunk, and a type specifier to specify type of the at least one chunk.

1   37.   The system of claim 36 wherein the at least one chunk is one of a head
2   chunk corresponding to one end of the data stream, a linking chunk corresponding to an
3   intermediate portion of the data stream, and a tail chunk corresponding to one other end
4   of the data stream.

1   38.   The system of claim 37 wherein the descriptor information includes at
2   least one of head and tail pointers, the head and tail pointers pointing to the head and
3   tail chunks, respectively.

1   39.   The system of claim 38 wherein the connection identifier points to one
2   of the head and tail pointers.

1   40.   The system of claim 34 wherein the controller comprises:
2   an ingress queue to buffer the data stream of a packet from the ingress of the
3   channel, the packet having a packet size; and
4   a queue segmenter to chunk the data stream into the at least one chunk.

1   41.   The system of claim 40 wherein the input buffer memory stores the at
2   least one chunk transferred from the queue segmenter.

1   42.   The system of claim 41 wherein the input buffer memory comprises a
2   queue associated with the connection identifier, the queue having a threshold and being
3   configured to store the at least one chunk.

1   43.   The system of claim 34 wherein the transfer condition includes at least
2   one of an overflow of the threshold, the packet size, and a scheduled egress request.

1   44.   The system of claim 43 wherein the controller further comprises:

2   a data combiner to combine the data portion of one chunk with the data portion

3   of at least one other chunk in the input buffer memory; and

4   a write circuit to burst write according to the scheduled egress request, the write

5   circuit to burst write the combined chunk data blocks to the second memory when the

6   packet size indicates that the packet is long, the combined chunk data blocks forming a

7   contiguous data block in the second memory, the write circuit to write the combined

8   chunk data blocks to the output buffer memory when the packet size indicates that the

9   packet is short.

1   45.   The system of claim 42 wherein the controller further comprises:

2   a list creator to create an ordered list of pointers associated with the chunk

3   headers of the one and the at least one other chunk, the ordered list of pointers being

4   transferred to the output buffer memory of the first type at a location pointed to by the

5   head pointer;

6   a read circuit to burst transfer the contiguous data block from the second

7   memory to the output buffer memory using the ordered list of pointers in the output

8   buffer memory when the packet size indicates that the packet is long; and

9   an egress queue to buffer the contiguous data block transferred from the output

10   buffer memory.

1   46.   The apparatus of claim 45 wherein the input buffer memory and the

2   output buffer memory have same sizes.

1   47.   The apparatus of claim 45 wherein the input buffer memory and the

2   output buffer memory have different sizes.

1   48.   The system of claim 45 wherein the first type is a static random access

2   memory and the second type is a synchronous dynamic random access memory.